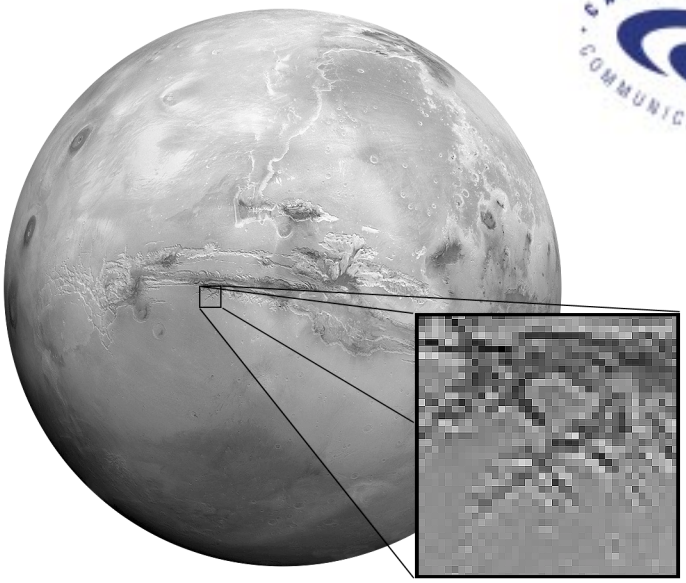


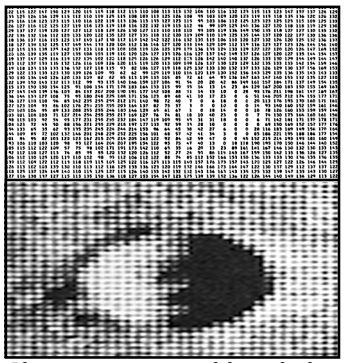
Canberra Space Centre
**FACT SHEET**
www.cdscc.nasa.gov

# Space Pictures

## Images from far away places

When a spacecraft records an image from space, that image is made up from thousands of pixels (short for *picture elements)*, tiny squares or dots that, when put together correctly here on Earth, make up an entire picture.

This long-distance photography involves three complex steps - taking the picture, getting the picture, and making the picture.



**Pictures are converted into shades of grey given specific values, these are then transmitted to Earth and reconstructed to form a picture.**

Taking the picture is the job of the spacecraft's imaging system: the digital camera, computer, and radio. When the spacecraft camera looks at its "target" - a planet or moon, for instance - light from the target object passes through the lens and then through a color filter before falling on an electronic chip called a charge-coupled device, or CCD.

The surface of the spacecraft's CCD is divided into 800 parallel lines, each of which is further divided into 800 light-sensitive pieces - a total of 640,000 picture elements, or pixels. Each pixel records the scene brightness through a given filter on a scale of values from 0 (black) to 255 (white).

The spacecraft's onboard computer takes all 640,000 values as recorded by the pixels and converts the values into digital code, made up of a series of 0's and 1's called "bytes." The radio transmitter then relays the "byte-stream" of data to Earth.

Getting the picture is the task of the Deep Space Network. The digital data byte-stream is received by the huge antenna receivers at any one of the three Deep Space Network sites around the globe - *Goldstone, California*; *Canberra, Australia*; and *Madrid, Spain*. The data is then relayed to the *Jet Propulsion Laboratory* (JPL), in *Pasadena, California*.

Rebuilding the picture is the work of JPL's Multimission Image Processing Laboratory. Once the data is received from the Deep Space Network, computers at JPL reformat the bytes into a two-dimensional image. The data is calibrated and processed to ensure a true representation of the targeted planet, moon, or other object, and then recorded on high-quality black-and-white or color film.

In addition, all images are made available in digital format on one of JPL's World Wide Web sites.

For more information:
**http://deepspace.jpl.nasa.gov/dsn/index.html**

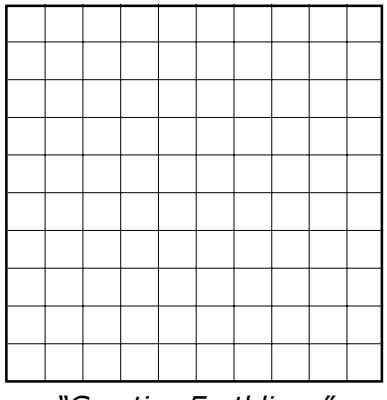
Links to various missions and pictures:
**http://www.jpl.nasa.gov**

### TRY THIS ONE YOURSELF...

Starting from the top left square, use the sequence below of '1s' and '0s' to complete a simple picture.

Leave the '0' squares blank, and colour-in the '1' squares.

0 0 1 0 0 0 0 1 0 0
0 0 0 1 0 0 1 0 0 0
0 0 1 1 1 1 1 1 0 0
0 0 1 0 1 1 0 1 0 0
0 0 0 1 1 1 1 0 0 0
0 1 0 0 1 1 0 0 0 0
0 0 1 1 1 1 1 1 1 0
0 0 0 1 1 1 1 0 0 0
0 0 0 1 0 0 1 0 0 0
0 0 1 1 0 0 1 1 0 0



*"Greeting Earthlings"*

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